12-2011

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*Trends in Ecology and Evolution* December 2011, Vol. 26, No. 12

Letters Response

# A general target for MVPs: unsupported and unnecessary

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In a recent article in TREE [1], we reviewed evidence for a consistent standardised estimate of minimum viable populations (MVPs) across taxa [2–4] and found that the universal MVP of 5000 adults advocated by Traill *et al.* [5] was unsupported by reanalyses of their data. We identified shortcomings in the original analyses, and found substantial uncertainty in standardised MVP estimates, both within populations of the same species and among species. We concluded that neither data nor theory supported a generally applicable MVP.

No evidence refuting the technical problems that we identified in their original analyses was presented by

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Brook *et al.* [6]. Instead, they agreed with us that a universally applicable MVP is illusory and that no such 'magic number' exists. Brook and colleagues' clear rejection of a universal MVP is important because both popular coverage [7] of their work and many statements in their own publications had suggested otherwise. For example, Frankham *et al.* [8] wrote that evidence against universality was simply '...an artefact of defining it for a fixed number of years, rather than generations'. Likewise, Traill *et al.* [5] stated that 'The bottom line is that both evolutionary and demographic constraints on populations require sizes to be at least 5000 adult individuals', judging 5000 to be a '...consensus... [and] useful benchmark' [5]. Even in their Letter [6], Brook *et al.* asserted that genetic arguments are sufficient to embrace a generalised MVP, overlooking statistical artefacts in the translation of effective size to census size and the substantive variation that characterises these data [9]. Their confidence in the merits of 5000 as an MVP conservation target is emphasised by its recent promotion as '...an empirically supported threshold MVP target' for conservation triage [10]. Given this backdrop of mixed messages, it is important to (re)emphasise the contingent nature of MVPs and the wide variability of standardised MVP estimates among populations and species [1].

Although Brook *et al.* [6] rejected a universally applicable MVP, they extolled the contradictory argument that a general rule of thumb remains scientifically defensible and pragmatically necessary. They asserted that, because conservation data are often lacking, decision-makers desperately need a general quantitative MVP target. We remain unconvinced of this 'desperate need'. Conservation practitioners and policy makers do not need unsupported rules of thumb that do not survive comparisons with data (standardised MVPs did not cluster around 5000 individuals but varied over five to eight orders of magnitude [2–4]). They are quite capable of dealing with uncertainty and context-specific conservation strategies, and are reluctant to embrace general rules of thumb for fear of being held strictly accountable to them when circumstances dictate otherwise (see [11]).

Brook *et al.* emphasised three possible benefits of a generalised MVP. First, they suggested that, when data and resources are scarce, a generalised MVP '...guided by general principles that are underpinned by theory, data and models, [and treat] uncertainty and assumptions explicitly and transparently' is a necessary alternative to expert judgment. We cannot reconcile this description with the flawed analyses that led to the unsupported generality of 5000 being christened a 'magic number' [7]. Brook *et al.*'s second purported benefit of a generalised MVP is as 'a defensible tool for prioritizing conservation actions' [5,10]. Evaluating the relative merits of conservation investments among species based on their population sizes, when ignorant of their threats, trends and other traits is a highly dubious enterprise [1]. A final application of a generalised MVP target is for listing and delisting decisions [6]. A general rule could define a point when conservation efforts are deemed to have been successful. However, if conservation work has been ongoing with any success, it seems inconceivable that those responsible could be so ignorant of the biology of, and threats to, the population that they would remain reliant on a generalised rule as proposed by Brook and colleagues to make a delisting decision. Thus, the most defensible use of a generalised MVP might be in listing decisions. Raising the International Union for Conservation of Nature (IUCN) criterion D1 for Vulnerable from <1000 mature individuals by a factor of five risks translating 'threatened' (a category that encompasses 38% of evaluated species) into such a commonplace designation that it ceases to carry any weight.

Brook *et al.* characterised our treatment of a generalised MVP as a '...distraction of minor scientific squabbles'. This characterisation is disingenuous because it ignores large variances in standardised MVP estimates, a stance that poses serious practical problems for conservationists. Arguing for the validity of an unsupported general MVP risks: (i) complacency when threatened populations exceed the suggested guideline; (ii) writing off populations as lost causes that could be viable at sizes well below the guideline size (see [12]); and (iii) establishing a shaky foundation for subsequent policy decisions. In the latter case, conservation biologists would do well to heed the lessons of other scientific fields in which even minor errors of fact have proven highly damaging to much broader enterprises (e.g. [13]).

The conservation of species that are deemed to have an unacceptably high risk of extinction, by whatever criteria, is a difficult undertaking. The 'sin' is not in demanding thoughtful consideration of the circumstances leading to increased rarity and how conservation practice might reverse that trend. Rather, the 'sin' is in implying that conservation science should compare the current population size of a species against an unsupported threshold to judge its safety, whether it is worthy of conservation expenditures, or whether it should be tossed from the ark.

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0169-5347/$ – see front matter 
doi:10.1016/j.tree.2011.09.014 Trends in Ecology and Evolution, December 2011, Vol. 26, No. 12